

FOUR NEW SPECIES OF THE GENUS *LEPTONETA* (ARANEAE, LEPTONETIDAE) FROM TAIWAN

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ABSTRACT. The new species *Leptoneta changlini*, *L. huisunica*, *L. nigrabdomina* and *L. taiwanensis* are described and illustrated from Taiwan, and the natural history of *L. changlini* and *L. huisunica* is described. These species are only known from male specimens.

Keywords: Leptonetidae, *Leptoneta*, Taiwan, taxonomy, Asia

Leptonetids are very small (1–3 mm), haplogyne spiders with slender legs, which construct irregular sheet webs in leaf litter or within caves (Yaginuma 1986). Leptonetids usually have six eyes, with the four anterior eyes situated in a strongly recurved row with the two posterior eyes almost merged. In some species, the eyes may degenerate to four, two or even none (Song et al. 1999). Their genitalia are quite simple, and some individuals have two pairs of book lungs (Yaginuma 1986). The family has a worldwide distribution and contains more than 100 species belonging to 13 genera (Platnick 1998), of which 64 species of the genus *Leptoneta* (Brignoli 1972, 1979; Chen et al. 1984; Dresco 1987; Fage, 1913; Gertsch 1974; Komatsu 1957, 1970; Nishikawa 1982; Paik 1985; Paik et al. 1969; Platnick 1986; Song & Xu, 1986; Yaginuma 1962; Yin et al. 1984) are known from the United States, Mexico, the Mediterranean region and southeast Asia.

Leptonetids dwell mostly in caves or in leaf litter and thus are not easily found. No species of this family has previously been recorded from Taiwan. In a long term ecological research project conducted in Hui-Sun Experimental Forest Station (23.9° N, 120.6° E, elevation 1600–1800 m) in central Taiwan many pitfall traps were established to survey the invertebrate litter communities (Wang et al. 2001). In Taiwan pitfall traps have rarely been used in arachnofauna surveys. Consequently many undocumented ground spider species were found in these collections.

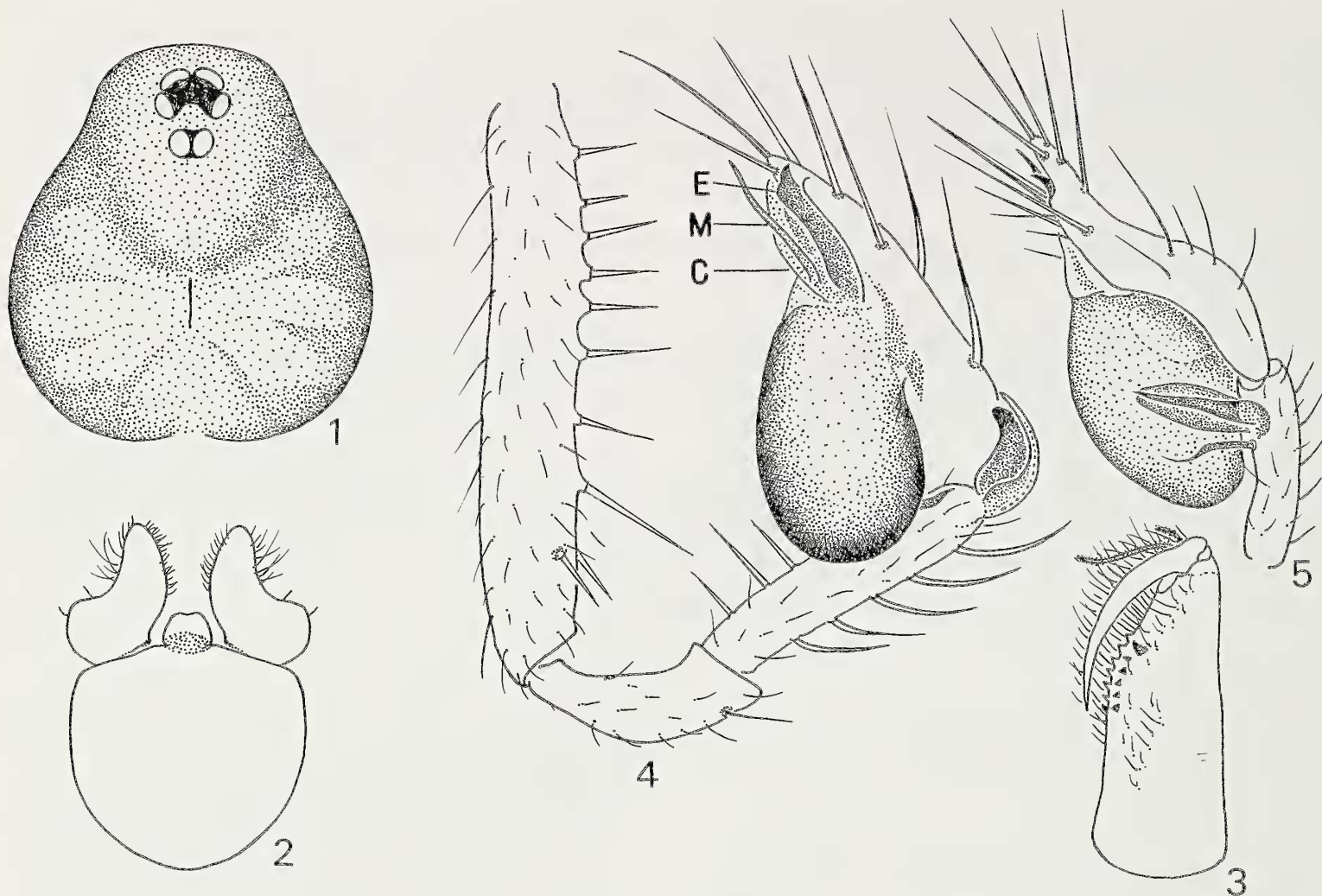
Among them are four species of *Leptoneta*, all of them are new to science.

In this paper we describe and illustrate these four species of *Leptoneta*. Pitfall traps were established in the study sites for a year and their contents collected every two months. This allowed us to draw natural history information from the temporal abundance pattern of the more abundant species, *L. changlini* and *L. huisunica*. In the species descriptions all measurements given are in millimeters. Size ranges of carapace and abdomen of the more abundant *L. changlini* and *L. husunica* were estimated from holotypes and paratypes. Palp and leg measurements are shown as: total length (femur, patella, tibia, metatarsus, tarsus). The type specimens used in this study are deposited in the National Museum of Natural Science, Taichung, Taiwan (NMNS-THU). Abbreviations used in this paper are: AER = anterior eye row; ALE = anterior lateral eye; AME = anterior median eye; EFL = length of eye field; PER = posterior eye row; PLE = posterior lateral eye; C = conductor of male palpal organ; E = embolus of male palpal organ; and M = median apophysis of male palpal organ.

TAXONOMY

Leptoneta changlini new species
Figs. 1–5, 18–19

Material examined.—Holotype male, Hui-Sun Experimental Forest Station, Nantou County, Taiwan, April 1998, Hai-Yin Wu



Figures 1–5.—*Leptoneta changlini* new species: 1. Cephalothorax of male, dorsal view; 2. Endites, labium and sternum, ventral view; 3. Left chelicera, retrolateral view; 4. Left palp, retrolateral view; 5. Left palp, dorsal lateral view.

(NMNS-THU-Ar-990046); paratype male, same locality as holotype, December 1997, Hai-Yin Wu (NMNS-THU-Ar-990045); 1♂, same locality as holotype, April 1998, Sheng-Hai Wu (NMNS-THU-Ar-010101); 1♂, same locality as holotype, April 1998, Sheng-Hai Wu (NMNS-THU-Ar-010102).

Diagnosis.—The new species resembles *Leptoneta inabaensis* Nishikawa 1982, but differs by having the chelicera with seven promarginal teeth (Fig. 3), instead of eleven as in *L. inabaensis*; femur of palp with one row of long and thick ventral spines (Fig. 4), lacking in *L. inabaensis*; distal end of cymbium (tarsus) not branched, rather than branched as in *L. inabaensis*; and also by the different shape of laminae of palpal bulb (Figs. 4–5).

Description.—Male (holotype): Total length 1.41 ± 0.60 . Cephalothorax 0.61 ± 0.02 long, 0.53 ± 0.01 wide; abdomen 0.80 ± 0.09 long, 0.52 ± 0.03 wide. Carapace yellow, with gray brown margins, radial furrows and cervical grooves; fovea brown. Clypeus 0.13 high, slightly sloped anteriorly. Six eyes: ALE: PLE: PME (0.05: 0.05: 0.05); ALE–

PME 0.06, PLE–PME 0.01, PLE–PLE 0.05. Chelicera light yellow brown, with seven promarginal teeth and six retromarginal teeth. Endites and labium light yellow brown. Sternum and legs yellow. Measurements of palp and legs: palp 1.26 (0.49, 0.20, 0.22, –, 0.35); I (1.11, 1.82, 1.27, lost, lost); II (0.87, lost, lost, lost, lost); III 2.70 (0.73, 0.16, 0.68, 0.64, 0.49); IV (1.03, lost, lost, lost, lost). Abdomen oval, light yellow, with light brown hairs, dorsum with four light black brown transverse stripes posteriorly, forming four transverse folds. Palpal femur and tibia with many long spines dorsally and ventrally (Fig. 4), tibia with two projections, inner one leaf-like, outer one horn-shaped (Figs. 4, 5).

Female: Unknown.

Etymology.—The new species is named in honor of the Taiwanese arachnologist Dr. Changlin Li.

Natural history.—Specimens of *L. changlini* are quite abundant in the Hui-Sun Experimental Forest Area and mature male specimens were collected in pitfall traps during April and December (Table 1). Therefore, in

Table 1. Number of male *Leptoneta* specimens collected bimonthly between December 1997 and October 1998 from pitfall traps established in the Hui-Sun Experimental Forest Station.

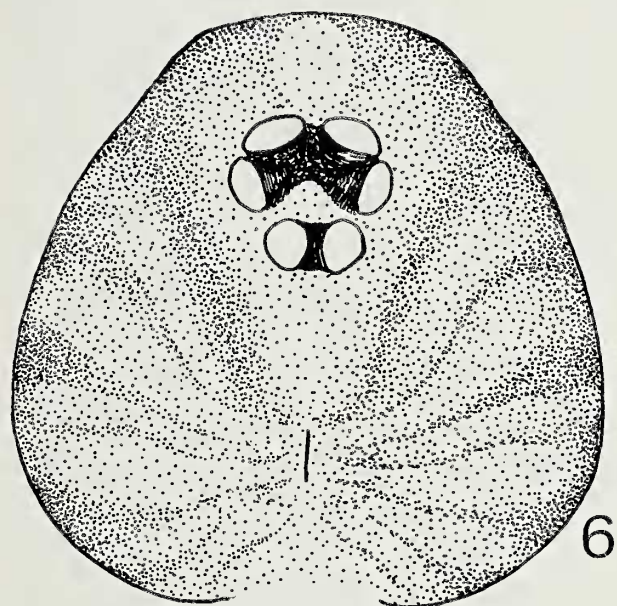
	Dec. 1997	Feb. 1998	Apr. 1998	June 1998	Aug. 1998	Oct. 1998
<i>L. changlini</i>	1	0	4	0	0	0
<i>L. huisunica</i>	2	1	6	1	2	2

the central mountainous area of Taiwan *L. changlini* seems to reproduce during winter and spring.

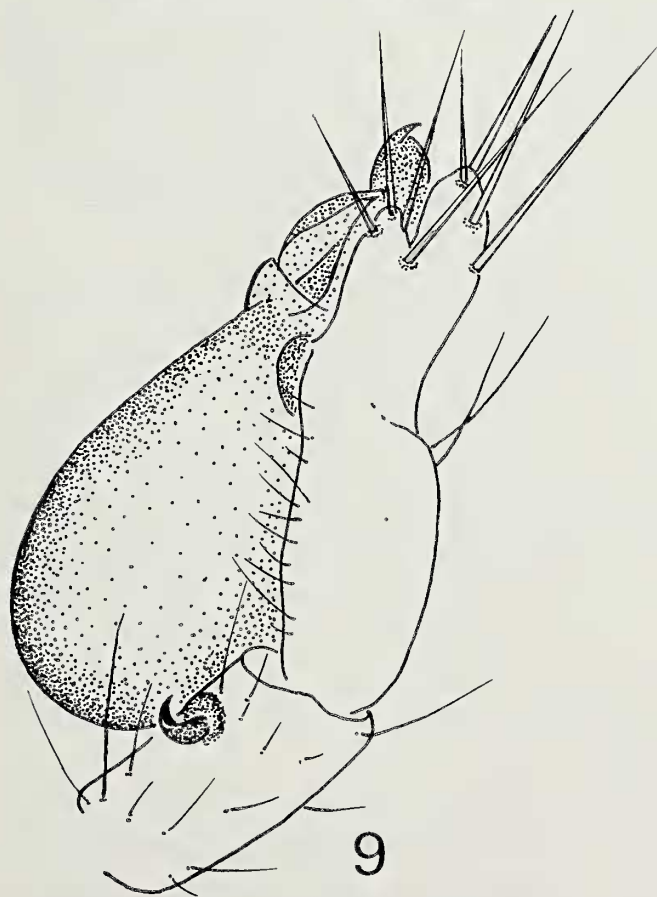
Leptoneta huisunica new species

Figs. 6–9, 22

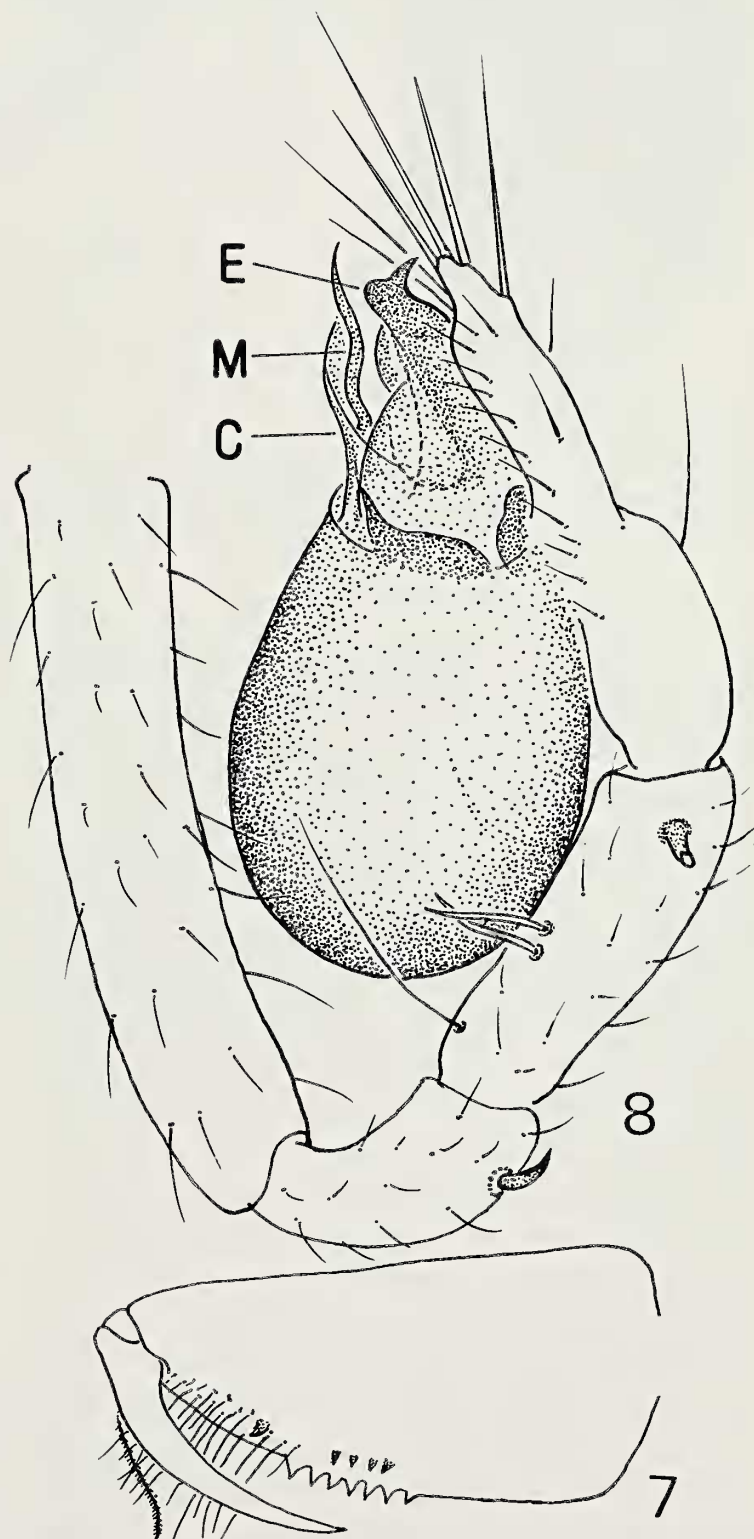
Material examined.—Holotype male, Hui-Sun Experimental Forest Station, Nantou County, Taiwan, April 1998 (NMNS-THU-Ar-990042), Sheng-Hai Wu; paratype male, same data as for holotype (NMNS-THU-Ar-990040); 1♂, same locality as holotype, December 1997 (NMNS-THU-Ar-990041), Hai-Yin Wu; 1♂, same locality as holotype, April



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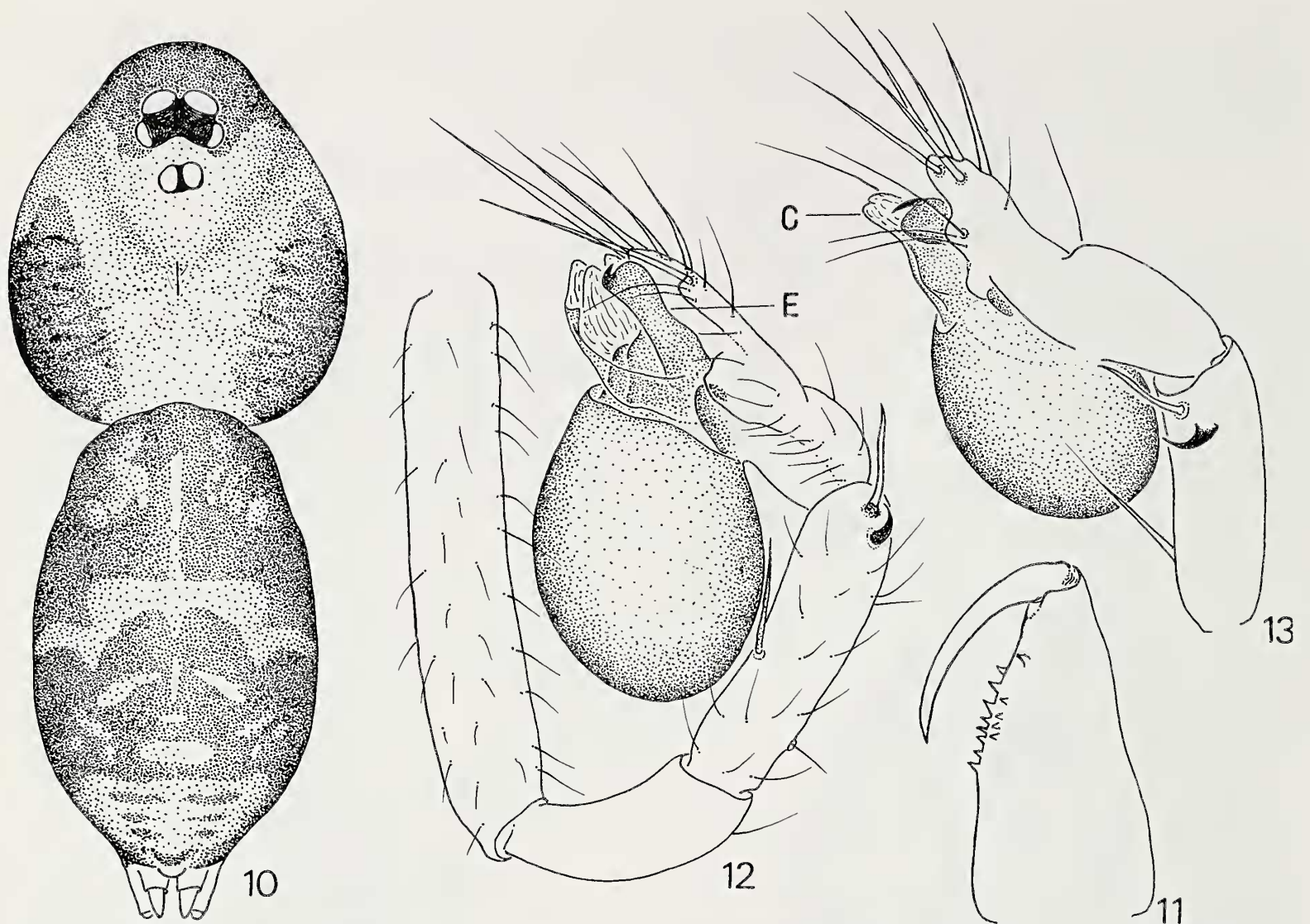
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Figures 6–9.—*Leptoneta huisunica* new species: 6. Cephalothorax of male, dorsal view; 7. Left chelicera, retrolateral view; 8. Left palp, retrolateral view; 9. Left palp, dorsal lateral view.



Figures 10–13.—*Leptoneta nigrabdomina* new species: 10. Body of male, dorsal view; 11. Left chelicera, retrolateral view; 12. Left palp, outer lateral view; 13. Left palp, dorsal lateral view.

1998 (NMNS-THU-Ar-010103), Sheng-Hai Wu; 1♂, same locality as holotype, February 1998 (NMNS-THU-Ar-010104), Hai-Yin Wu; 1♂, same locality as holotype, February 1998 (NMNS-THU-Ar-010105), Hai-Yin Wu.

Diagnosis.—The new species is similar to *Leptoneta lingqiensis* Chen, Shen & Gao 1984 in the shape of the male palpal organ, but can be easily distinguished by the chelicera with 7 promarginal teeth and 5 retromarginal teeth (Fig. 7), instead of the 8 promarginal and 6 retromarginal teeth as in *L. lingqiensis*; male palpal tibia with one projection that is not distally branched, instead of 2 branches as in *L. lingqiensis*; and the different shape of laminae of the palpal bulb (Fig. 9).

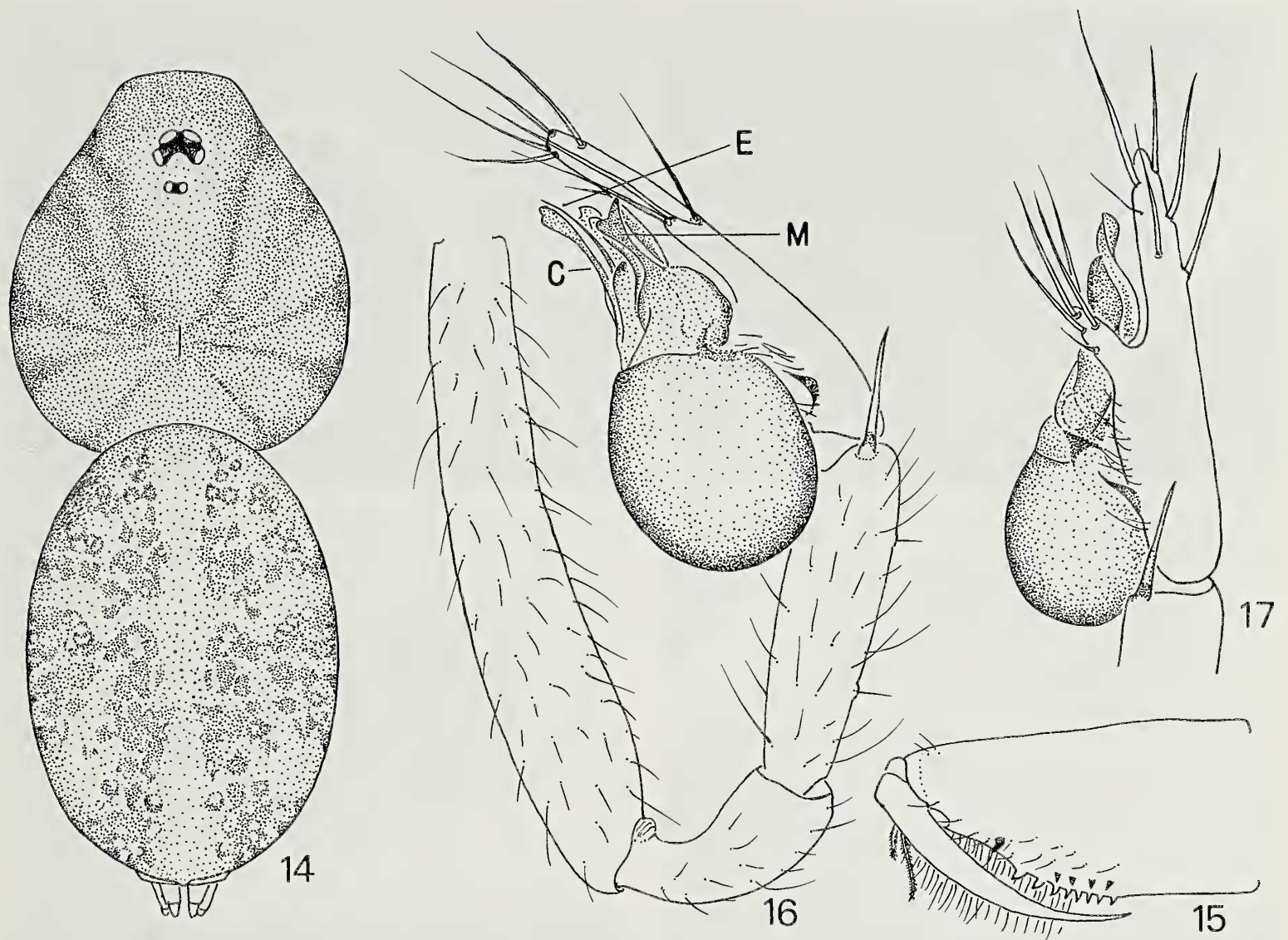
Description.—Male (holotype): Total length 1.58 ± 0.17 . Cephalothorax 0.67 ± 0.07 long, 0.60 ± 0.04 wide; abdomen 0.93 ± 0.09 long, 0.64 ± 0.06 wide. Carapace cream-colored, with light yellow brown margins, radial furrows and cervical grooves; fovea brown. Clypeus 0.14 high, not sloped and almost vertical. Six eyes: ALE: PLE: PME (0.08: 0.07:

0.05); ALE–PME 0.05, PLE–PME 0.01, PLE–PLE 0.09. Chelicera light yellow brown, with 7 teeth on promargin and 5 on retromargin. Endite, labium and sternum light yellow brown. Legs yellow, with several long and thin spines. Measurements of palp and legs: palp 1.01 (0.40, 0.13, 0.18, -, 0.30); I 4.44 (1.34, 0.20, 1.56, 0.81, 0.53); II (1.00, lost, lost, lost, lost); III (0.82, lost, lost, lost, lost); IV (1.11, lost, lost, lost, lost). Abdomen oval, dorsum gray yellow, with six light black brown transverse stripes postero-medially, venter yellow. Colulus thin and tipped. Palpal tibia with a single hook-like projection disto-laterally (Fig. 9); patella with a short dorsal spine (Fig. 8); cymbium with 2 distal branches (Fig. 9).

Female: Unknown.

Etymology.—The specific name refers to the type locality.

Natural history.—Among the four species of *Leptoneta* found within the Hui-Sun Experimental Forest Area, *L. huisunica* was the most abundant. Mature males were found in pitfall collections during almost all months



Figures 14–17.—*Leptoneta taiwanensis* new species: 14. Body of male, dorsal view; 15. Left chelicera, retrolateral view; 16. Left palp, retrolateral view; 17. Left palp, dorsal lateral view.

(Table 1). Therefore, *L. huisunica* seems to reproduce throughout the year in the central mountainous area of Taiwan.

Leptoneta nigrabdomina new species

Figs. 10–13, 23

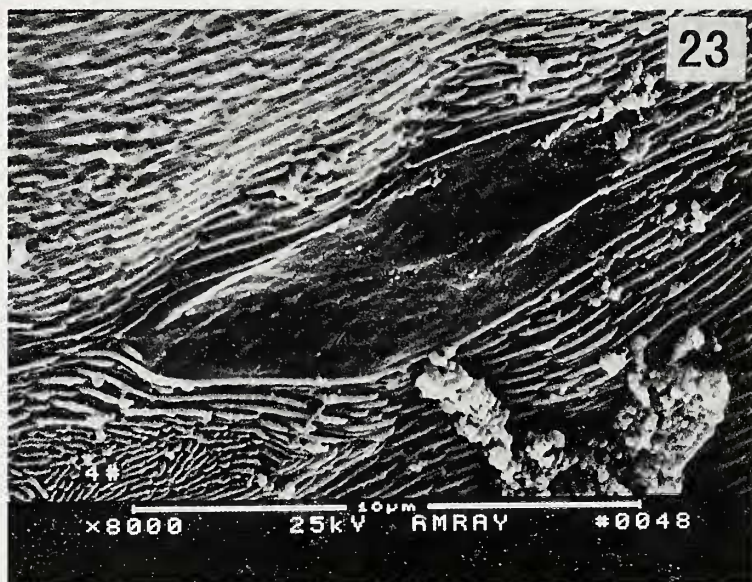
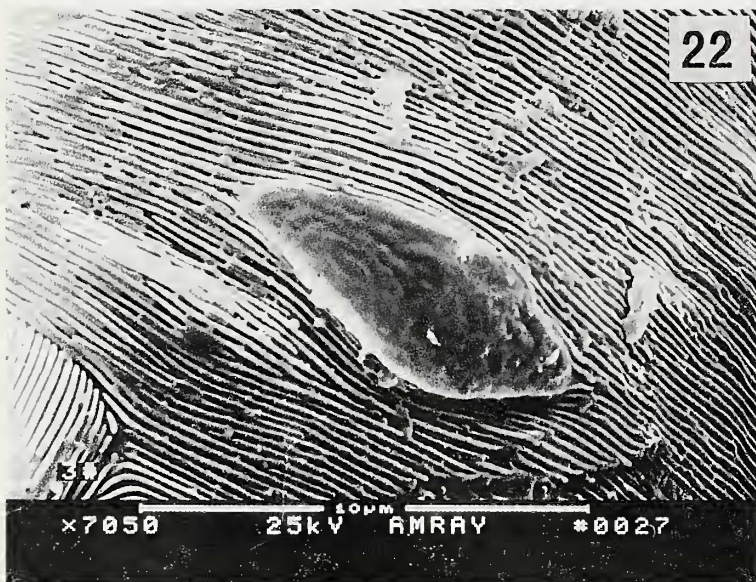
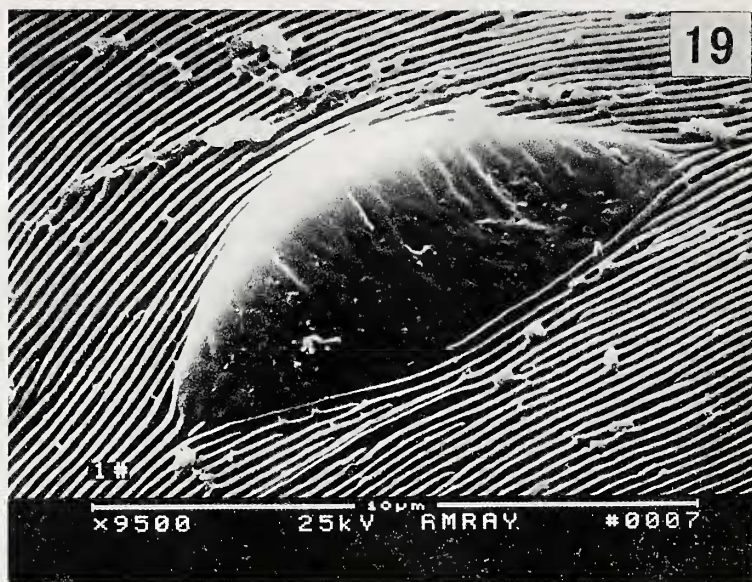
Material examined.—Holotype male, Hui-Sun Experimental Forest Station, Nantou County, Taiwan, April 1998, Sheng-Hai Wu (NMNS-THU-Ar-990043).

Diagnosis.—The new species resembles *Leptoneta taeguensis* Paik 1985 in the shape of the male palpal organ, but differs by the carapace and abdomen having black patches (Fig. 10), which are lacking in *L. taeguensis*; chelicera with 5 retromarginal teeth (Fig. 11), instead of 3 as in *L. taeguensis*; palpal tibia with a large spine and a horn-shaped projection on the distal end, instead of tubercle seen in *L. taeguensis*; and the different shape of laminae of the palpal bulb (Figs. 12, 13).

Description.—Male (holotype): Total length 1.57. Cephalothorax 0.68 long, 0.65

wide; abdomen 0.91 long, 0.56 wide. Carapace yellow. Clypeus 0.14 high, light yellow brown, slightly sloped anteriorly. Thorax black brown on both sides. Fovea brown. Six eyes: ALE: PLE: PME (0.08: 0.07: 0.07); ALE–PME 0.08, PLE–PME 0.02, PLE–PLE 0.09. Chelicera light yellow brown, with 7 promarginal teeth and 5 retromarginal teeth. Endite, labium and sternum deep yellow. Legs light yellow brown, with several slender spines. Measurements of palp and legs: palp 1.11 (0.45, 0.18, 0.23, -, 0.25); I (2.12, 2.65, lost, 2.00, 1.18); II (1.40, lost, lost, lost, lost); III (1.13, lost, lost, lost, lost); IV (1.58, lost, lost, lost, lost). Abdomen elliptical, scattered with thin white hairs, dorsum black-brown, with several yellow patches, venter and spinnerets light yellow. Palpal femur and tibia without thick long spines dorsally; tibia with 2 distal projections on outer side, 1 spine-shaped, the other horn-shaped; cymbium not branched (Figs. 12, 13).

Female: Unknown.



Figures 18–23.—Cuticular plates of tibial and patellar glands. 18–19. Cuticular tibial plate of *Leptoneta changlini* new species; 20–21. Cuticular patellar plate of *Leptoneta taiwanensis* new species; 22. Cuticular tibial plate of *Leptoneta huisunica* new species; 23. Cuticular patellar plate of *Leptoneta nigrabdomina* new species.

Etymology.—The specific name refers to the black abdomen of the holotype.

Leptoneta taiwanensis new species

Figs. 14–17, 20, 21

Material examined.—Holotype male, Hui-Sun Experimental Forest Station, Nantou

County, Taiwan, February 1998, Hai-Yin Wu (NMNS-THU-Ar-990044).

Diagnosis.—This species is similar to *Leptoneta monodactyla* Yin, Wang & Wang 1984 in the shape of the palpal organ, but can be easily distinguished by the male palpal tibia which has a spine-shaped projection on the

distal end rather than finger-shaped as in *L. monodactyla* (Figs. 16, 17); cymbium branched near the distal end with a triangular laminar spur on the outer side of the base. In *L. monodactyla* (Fig. 17) the cymbium is unbranched, the laminar spur is lacking and the palpal laminae are shaped differently (Figs. 16–17).

Description.—Male (holotype): Total length 1.56. Cephalothorax 0.68 long, 0.66 wide; abdomen 0.90 long, 0.61 wide. Carapace yellow, with light yellow brown radial furrows and cervical grooves. Fovea short, light brown. Clypeus 0.18 high, distinctly sloped anteriorly. Six eyes: ALE: PLE: PME (0.05: 0.03: 0.03); ALE–PME 0.07, PLE–PME 0.04, PLE–PLE 0.05. Chelicera light orange, with 8 teeth on promargin and 5 on retromargin. Endites and labium light yellow brown. Sternum yellow. Legs yellow, with several long and thin spines. Measurement of palp and legs: palp 1.56 (0.65, 0.25, 0.27, -, 0.39); I (1.99, lost, lost, lost, lost); II (1.51, lost, lost, lost, lost); III (1.22, lost, lost, lost, lost); IV (1.68, lost, lost, lost, lost). Abdomen oval, dorsum yellow, with indistinct light yellow brown patches, venter yellow, with a light yellow brown rectangular patch behind the epigastric fold. Femur and tibia of palp without thick spines dorsally, tibia with a spine-shaped projection on outer side of distal end (Figs. 16–17). Cymbium of palpal organ with two branches on the distal end (Fig. 17).

Female: Unknown.

Etymology.—The specific name is a noun in apposition referring to Taiwan.

TIBIAL AND PATELLAR PLATE MORPHOLOGY

In this study the tibial or patellar cuticular plates of each of the new Taiwanese species of *Leptoneta* were examined by SEM. *Leptoneta changlini* and *L. huisunica* have similar plates on the patellae and tibiae. Because the tibiae of *L. nigrabdomina* and *L. taiwanensis* were not available, only the patellae of these two species were examined. The tibial and patellar plates of *L. huisunica* (Fig. 22) and patellar plates of *L. nigrabdomina* (Fig. 23) and *L. taiwanensis* (Figs. 20, 21) are paramecium shaped and resemble those of the *Leptoneta* species from the Mediterranean region (see Platnick 1986, figs. 17–20). The tibial plates of *L. changlini* (Figs. 18, 19) resemble the pa-

tellar plates of *Archoleptoneta stridulans* Platnick 1994 (see Platnick 1994, fig. 8) in shape, but the former is hunched in the center and thus *L. changlini* is unlikely to be a member of this genus. Only two southeast Asian leptonetid genera have previously been studied using an SEM: *Masirana akiyoshiensis* (Oi 1958) lacks tibial or patellar plates, and the tibial plate of *Falcileptoneta striata* (Oi 1952) is round, bearing a large, longitudinal median ridge (Platnick 1986). Since the tibial plates of *L. changlini* are so unique, perhaps this species should be placed in a novel genus. Because a detailed survey of the tibial or patellar plates of southeast Asian leptonetids is currently not available, it seems sensible to let the problem lie until more work is undertaken.

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